

**Oviposition of *Cyrtopogon inversus*<sup>1</sup>**

(Diptera: Asilidae)

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There is a paucity of information concerning the oviposition behavior of asilids belonging to the genus *Cyrtopogon* Loew. Bromley (1946) observed that, like other members of the subfamily Dasypogoninae, *Cyrtopogon* females possess spines on the ovipositor which are used to brush soil over the eggs following oviposition.

Of the 98 described species of *Cyrtopogon* (Hull, 1962), detailed observations have been made for one species in Sweden, *Cyrtopogon lateralis* Fallen and a species in Russia, *Grypoctonus* (*Cyrtopogon*) *daimyo* Speiser.

*Cyrtopogon lateralis* females deposit elongate whitish yellow eggs in the soil (Melin, 1923). The presence of large numbers of spines on the ovipositor was presumed to be associated with its habit of ovipositing in hard soil mixed with clay. Melin noted that *C. lateralis* used these spines to brush soil over the eggs and to hide the oviposition hole. Lehr (1966) made the following observations for *Grypoctonus* (*Cyrtopogon*) *daimyo* (translated from the Russian):

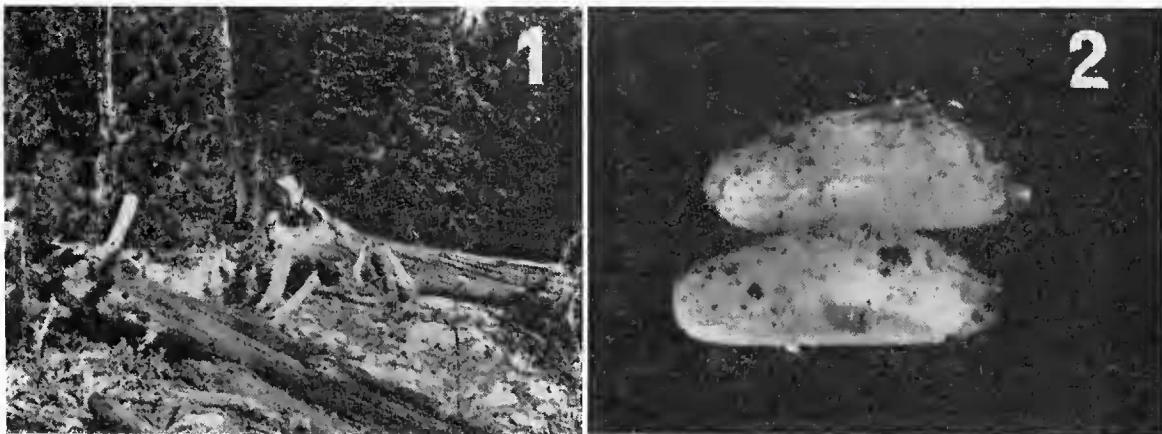
"Eggs are deposited in loose soil along pathways, under a grassy slope, or near fruit trees in gardens. During oviposition, the female bends the abdomen and buries it in the ground, often up to the very wings. Judging from the depth at which eggs are found, one may assume that the abdomen extends slightly during oviposition. There is one rosy-yellow egg laid in each place. During oviposition the female crawls from place to place or flies over short distances."

Lavigne (unpublished data) observed a *Cyrtopogon* sp. (probably *glarealis* Melander) ovipositing at the base of a grass clump among wood chips in soil and duff near Grassy Lake in Teton National Forest, Wyoming. Oviposition occurred at 3:10 PM in the shade where the soil temperature was 31°C.

The following observations were made of *Cyrtopogon inversus* on Elk

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FIGS. 1-2. Fig. 1. Coniferous forest clearing where *Cyrtopogon inversus* ovipositions were observed. Fig. 2. Elongate creamy white eggs of *Cyrtopogon inversus* (52 $\times$ ).

Mountain near Elk Mountain, Wyoming. The area was located in a coniferous forest clearing at an elevation of 2,520 m above sea level (Fig. 1). Several complete ovipositions were observed between 12:00 noon and 2:30 PM between July 18th and 21st, 1972. All eggs were deposited in the soil or in the soil litter.

Prior to oviposition *Cyrtopogon inversus* females usually "searched" for suitable sites to deposit their eggs. Females flew 45 to 60 cm above the ground in a zigzag path and made two to three 60 to 72 cm circles about a site before landing to oviposit. Once females landed they crawled 2.5 to 5 cm into the shade of vegetation, small pieces of wood, or rocks. As the females crawled along the ground, some were observed to thrust their ovipositor from side to side as we have seen other asilids do in their search for suitable oviposition sites.

Once in the shade the flies ordinarily pushed their ovipositors directly into the substrate. However, two females dug their ovipositors into the soil with rapid lateral sweeping movements. It is assumed that most females did not exhibit such behavior because of the ease with which they could insert their ovipositors into the loose litter.

While ovipositing, females rested their legs on the substrate and kept their wings folded over their body. The arched abdomen was sunk into the substrate up to the posterior margin of the second abdominal segment.

The average time for a complete oviposition was 2 minutes, with a range between 1 and 3 minutes. Once eggs were deposited, females either withdrew their ovipositor with rapid lateral sweeping movements, which covered the eggs and oviposition hole with soil or litter, or flew off without exhibiting such behavior.

At the time of oviposition, substrate surface temperatures ranged

between 27 and 39°C. The temperature 3 to 4 mm under the surface, at the approximate depth at which the eggs were laid, varied between 32.5 and 37°C.

The eggs of *Cyrtopogon inversus* are creamy white (Fig. 2). Two to four eggs were laid per clutch and apparently "cemented" together. Individual females were observed to oviposit up to three times before being lost to sight.

The elongate eggs of this species ranged in length from 1.12 to 1.42 mm, with a mean of 1.31 mm. The average width was 0.48 mm, with a range which varied between 0.42 and 0.56 mm. Eggs examined with a scanning electron microscope, up to 2,000×, showed no surface sculpturing.

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